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THE EMPIRE MARKETING BOARD.

THE expansion of England has taken place continuously since modern times and while other lands were busy with a policy of colonial expansion in the nineteenth century, problems of the autonomy of the large units of the Empire and administration in the colonies arose and faced the British Government. The widespread nature of the Empire interfered a good deal with the maintenance of a common and continuous policy, but the racial expansion in the temperate lands created home and economic ties that were later consolidated by Colonial and Imperial Conferences. In the work of establishing a common policy, the Imperial Conferences did valuable work, but in general they concerned themselves with the Dominions rather than the colonies. Although no neglect of the non-self-governing parts of the Empire was shown in the 1926 Conference, it was pleasing to find a Colonial Office Conference organised for the discussion of their special problems. The Conference policy is one that is being adopted more generally and is likely to be followed by good results. Representatives in different parts are brought together, discuss and illuminate each others problems, and cause their grievances or suggestions to be more telling by being made collectively. Improvements in transportation and technique have hastened general economic progress, and the commercial policy of Great Britain has run on the lines of improving inter-imperial trade. Neighbouring European countries and the United States have carried on a policy of economic nationalism behind tariff walls, but the United Kingdom, which, influenced by the course political thought in the middle of the nineteenth century, committed itself free trade, has not yet to any appreciable extent departed from that doctrine. The British Electorate favours free trade principles, and in the election which followed the 1922 Conference, imperial preference, as a means of improving trade, was rejected. However, the Imperial Economic Committee since this Conference proved that the improvement of co-operation and development in the Empire did not end with preference. Under its auspices, investigations on economic lines were undertaken and undoubtedly proved of value. The Empire Marketing Board which has recently published a report on *A year's progress*, set out to extend and develop the work of the Economic Committee. At the Imperial Conference, 1926, Mr. Amery stated that the Empire Marketing Board was

established to compensate for the failure of the British Government to carry out in full the system of preferences laid down at the last Imperial Conference. How should we expect such an institution of the Empire Marketing Board to work. In the first case, demand for most final products rests with the consumer purchasing through the retailer. Although he usually regards himself as a free agent, it is doubtful whether he is; the direction of his demands is consciously or unconsciously influenced by advertisement or by salesmen. Consequently a good deal may be expected from well directed publicity for Empire products. The publicity part of the Board's programme has taken various forms, and has been not least effective in the decorative and forceful posters by able artists. Interest has been stimulated overseas by Empire shopping weeks and several members of the Board have paid visits to different parts of the Empire. These visits, together with those to the United Kingdom of the prime producers overseas enable representatives of these latter to judge with greater accuracy the type of commodities that will find a ready market. The idea has been to draw attention in general terms to Empire produce, leaving specialised campaigns to the trading interests particularly affected. Publicity, however, would be valueless unless the quantity and quality of the goods advertised came up to the claims made for them, and the Board has refrained deliberately from a costly programme, preferring to husband its resources and to concentrate on work that must be regarded as an essential preliminary to any effective publicity campaign. Before goods pass to merchants or retailers they have to pass through organised marketing channels and meet the competition of goods from other sources. Marketing is a specialised function and its efficient organisation and the elimination of waste in its various stages are problems calling for close and continuous study and intimate contact with organisations of producers and traders. In marketing investigations the work of the Imperial Economic Committee on Fruit, Meat and Dairy Produce constituted the starting point of the work of the Board. Before the goods can be marketed they have to be produced, and to secure good quality the producer should be made aware of the most appropriate methods of sowing and planting, of tending and harvesting. Already much has been done in the ordinary routine work of the agricultural departments, and this help will improve when effect is given to the recommendations in the report on "Agricultural Research and Administration in the Non-Self-Governing Dependencies." Our readers will recall that a better method of recruitment of agricultural officers was mooted and a scheme for co-ordination of the research work of the specialist and general agricultural officers. These officers, however, have not as much time to devote to special problems as is necessary and it was planned that this work might be undertaken at centres such as the Imperial College of Tropical Agriculture in Trinidad and the Amani Institute in Tanganyika and at other Stations which are contemplated in West Africa, the East and Australia. The Empire Marketing Board has recognised the great value of such work and although it has made no attempt itself to engage directly in scientific research it has sought to fortify existing scientific institutions in such measure as would enable them to intensify or develop their work and to make possible the establishment of new institutions to meet new and proven needs. Scientific institutions in the United Kingdom have secured a considerable share of the grants, and the Board hopes to get more into touch with similar organizations Overseas through the Imperial Agricultural Research Conference which is being held this month. In the tropics particularly, scientific agricultural research is important. Climatic conditions give an opportunity of quick multiplication of crops, but at the same time the incidence of pests and diseases is much greater than in the temperate climes. To help in this research, the Board has given assistance to the Imperial College of Tropical Agriculture and definitely promised help to the Amani Institute, while it has agreed in principle to recommend a considerable grant towards other research stations that it is prepared to start in certain well defined areas. Grants have also been made to the Imperial Bureau of Entomology and the Cawthorn Institute, New Zealand, for the extension of Entomological work and in particular for the creation of a central laboratory in England for parasite breeding and testing. In recognition of the increasing importance of the fruit trade, attention has been given to the development and improvement of Empire Resources and the technique evolved at the East Malling, Long Ashton and Cheshunt Research Stations, which have received help, should be applicable to many other fruits than those which will grow in Great Britain. In the successful marketing of Empire produce, the development of cold storage processes is important, and the excellent work accomplished already by the low Temperature Research Station at Cambridge has been recognised by the provision of a substantial grant by the Board. The prevalence of panama disease in the banana-growing areas of the West Indies lends special importance to a grant made to the Imperial College of Tropical Agriculture at Trinidad for the prosecution of research into the production of a variety immune from disease. Investigations into the transport of bananas under cold storage conditions are also being facilitated by a grant for the erection at the College of an experimental cold storage station.

The conception of what should be the work of the Board reflects great credit on those responsible for its policy; money has been spent to secure adequate and continuous supplies of commodities from all parts of the Empire, marketed on economic lines and sufficiently well advertised to create in the minds of consumers a bias in favour of Empire products.

INSECTICIDES.

Their Action and Constitution.

THE choice of an efficient insecticide for any particular pest cannot be made without a knowledge of the life cycle of the insect, for there is usually some phase in the career of an insect when it becomes particularly vulnerable to poisons or corroding agents. In some cases the egg may be particularly easy to destroy, in others it may best be attacked in the larval stage where the caterpillar is feeding eagerly, while others again are most subject to attack in the pupal stage, or in the final insect stage. Many factors must be taken into consideration—the length of the vulnerable stage, a very short period may necessitate accurate timing of an attack, method of feeding, whether by biting with jaws or by sucking with a plunger, mobility of the insect, the type of vegetation attacked and its stage of growth.

Insecticides may be classed into two main groups, preventative and curative, the latter type being by far the most important. Each of these groups may again be subdivided, the preventative measures into cleansing washes and cover washes, the curative measures into *contact insecticides* and *stomach or internal poison insecticides*. The cleansing washes are sprays whose sole function is to remove any harbouring ground for eggs or early stages of the insect from the plant. Caustic soda is often sprayed on the trees for this purpose. A tree or shrub is sprayed thoroughly with a cover wash of some substance such as lime which serves to seal up the eggs or smother the young insects directly they are hatched. These two methods of attack are applied almost entirely to trees or shrubs in the dormant stage and consequently are of little use in dealing with tropical pests. Of the two types of curative insecticides, the stomach poisons are those which are incorporated with the food of the insect by spreading them over the foliage on which the insect feeds, and can only be applied to those insects or to those stages in the life of the insect which obtain their food by biting. Nicotine may be quoted as an example.

The contact poisons, by which is implied poisons affecting the insect externally through corrosion of the skin, find chief use in the control of insects obtaining their food supply by sucking plant juices, or in the destruction of eggs or the pupal stage.

Contact insecticides may be applied either as vapours or sprays, but there are obvious difficulties in the path of using vapours in field work. Consequently the chief method of applying insecticides in the field is by means of spray, while the use of vapours is restricted to control of glass house pests, and to soil fumigation. Certain compounds, however, even when sprayed as liquid or emulsion may only produce their poisoning effect in the vapour stage, being introduced into the respiratory system of the insect where they do their work. Hydro-cyanic acid, tetrachlorethane, chloropicrin, naphthalene, although applied as liquid sprays all act as fumigants, being first transformed into the vapour stage.

A study has been made of the relation between chemical constitution and the toxic effect on insects of certain organic compounds suitable for insecticides by F. Tattersfield (*Journ. Agric. Sc.*, Vol. xvii, p. 181 and other papers). It is known that the physiological effect of organic compounds is dependant upon the presence or arrangement of certain groups or atoms in the molecule and a change in chemical constitution will alter the toxic effect of a compound. But toxic effect, especially rapid effect required in insecticides, will also be influenced by the physical properties of the substance—by the solubility, the volatility, the depression in surface tension in solution. Consequently, since a change in chemical constitution is usually accompanied by a corresponding change in physical properties, it is a matter of some difficulty to separate the two effects and to apportion correct relative values to each.

It is therefore very difficult to detect cross-relationship between compounds widely differing in constitution and more may be gained by the study of groups of compounds having slightly differing constitutions and slightly differing physical properties. In general, however, whereas chemical constitution affects the actual toxic power of the substance the physical properties determine its rapidity of action and its means of application.

The importance of volatility and its relation to toxicity was one of the first factors to be investigated. Generally in any one group of similar compounds the toxic action increases with decreasing volatility, though the less volatile compounds may take longer to act. On the other hand, a too volatile substance may evaporate before it has had a chance to produce effect. A series of hydro-carbons were tested and it was found that naphthalene was actually more toxic than benzene though the latter more volatile compound produced greater immediate effect.

The fatty acids, a series of compounds of very similar chemical constitution but having a regular gradation in their properties, afford a good example of the influence of physical properties on insecticidal action. The acids used contained from one to eighteen carbon atoms having a general formula ($C_n H_{2n+1} COOH$). As the number of carbon atoms in the molecule increases the physical properties change—volatility decreases, melting point increases, solubility in solvents such as water, oils and fats varies uniformly, and the relative lowering of surface tension increases with increasing molecular weight.

The rapidity of action will depend not only on the ease with which the poison can come in contact with the insect, but also on its power of interaction with, or penetration of, the membrane and matter forming the cells of the living insects. It is found that to some extent the more soluble fatty acids tend to be the more toxic, and also since

much of the material forming the animal cell is of a waxy nature the toxic action bears some relation to the partition co-efficient of the acid (that is, the ratio of its solubilities in oil and in water obtained by an extraction method). Some workers have determined that the rate of penetration of cell membranes by a series of compounds bears some relationship to the relative surface tension, and there is the possibility of this factor influencing the toxicity of compounds.

The strengths of the acids seem to play a very small part in determining their insecticidal values, and the formation of esters produces only a small change. Neutralization of the acid by ammonia to form the ammonium salt reduces the toxicity of the lower acids, but has small effect only on the higher ones containing from ten to thirteen carbon atoms, while the toxicity is increased for myristic and oleic acids (containing 14 and 18 carbon atoms, respectively) presumably through increasing the solubility of these two acids. The toxicity appears to increase from acetic to undecylic acid (11 carbon atoms) and the declines to zero in tetradecylic acid (14 carbon atoms). It is possible that in undecylic acid the chemical properties promoting the toxic action are in equilibrium with the physical properties tending to hinder that action.

Tests were carried out on many other series of organic compounds and their relative toxicities determined. Of the chlorine derivatives of benzene, 1:2:4: trichlor-benzene was the most toxic, the entrance of a further chlorine atom into the nucleus decreasing toxicity. Nitro groups likewise increase toxic effect, meta-dinitro benzene proving the most toxic. The phenols and their methyl derivatives proved to have a great toxic value. Methylating the hydroxyl group of phenol reduced its power, but methylation of di- or tri-hydroxy benzene increased the toxic power—thus trimethoxy benzene (1:2:3:) was the most toxic of this series of compounds. Accumulation of both nitro and hydroxyl groups on the benzene ring increased the power even more, 2:4 dinitro-phenol and 3:5 dinitro-cresol having very great effect. The relative positions of the different groups modify toxicity to some extent, thus para and meta derivatives are somewhat more toxic than the ortho derivative. Of the amines, tetramethylammonium and tetraethylammonium afford an interesting instance of two compounds having very similar physical properties yet being markedly different in physiological behaviour—a difference which can only be accounted for by differences in chemical constitution. Lastly of the N-hetereocyclic compounds, nicotine is the most active, in fact it is second only to certain natural poisons in toxic action. The arrangement of the whole nicotine molecule appears to contribute to its toxic properties.

A number of fish poisons obtained from various plants and long used in various parts of the world for catching fish were also examined. Only those poisons obtained from the order *Leguminosae* had any insecticidal value, and these proved to be some of the most powerful toxicants known. The best known is obtained from the tuba root of the Malayas (*Denis elliptica*), and from the roots and stems of the "white" and "black" haiari (*genus Lonchocarpus*) found in British Guiana, which contain an active crystalline substance known as "tubatoxin" accompanied by a resin (derride). Several other tropical plants all of the order *Leguminosae*, yield these strongly insecticidal fish poisons, but it is doubtful whether they will ever compete with the present synthetic preparations. More use, however, might be made of them in the tropical countries where they grow—Malay and British Guiana—for they undoubtedly have great value as insecticides.

Many practical considerations must be taken into account in valuing an insecticide, some of which may be briefly mentioned. Firstly an insecticide must have little or no effect on the plant harbouring the pest—some of the compounds mentioned are debarred from general use because of their effect on foliage, though they may sometimes be used in temperate countries as winter-washes. Adhesive power, especially under the influence of rain, is a further factor. It must be possible to spread a good insecticide easily and uniformly—usually by spraying. Insoluble compounds are sprayed as fine emulsions produced by the addition of some emulsifying agent such as soft soap, while certain oil mixtures are coming in favour as solvents for water insoluble compounds. The spray must wet the leaves or it will lack adhesive power. Finally, come the commercial requirements of small bulk and suitability for transport.

H. H. Croucher.

"The Times" announces the annual awards of the trustees of the John Simon Guggenheim Memorial Foundation for the year 1927-28. Sixty-three fellows have been chosen for their "unusual capacity for productive scholarship or unusual creative ability." The average amount of each scholarship is $2,500 (£500), but the sum allotted has been carefully adjusted to the needs of the individual and the cost of the researches to be undertaken. Unlike the Rhodes Scholars, who all proceed to one centre of learning the Guggenheim Fellows will be scattered far and wide through Europe, while a few will betake themselves to the other continents. A former Rhodes Scholar, Mr. Frank Aydelotte, President of Swarthmore College, is chairman of the committee making the awards.

One of the fellowships has been awarded to Dr. R. B. Harvey, "to investigate low-temperature effects on plants, principally at Cambridge. Dr. Harvey has discovered that ethylene gas will hasten the ripening of fruits and vegetables. By injecting less than 40c. worth of gas into a carload of green bananas they can be ripened within 48 hours."

LIVESTOCK.

Types used in the Sugar Industry.

By H. V. M. Metivier, O.B.E., B.Sc., M.R.C.V.S.

It has been well said that no system of agriculture is complete or well grounded unless it includes within its scope the production of livestock, especially cattle, for these animals are necessary to consume the waste product of the farm, and to help conserve the fertility of the soil.

The livestock kept on sugar plantations, can be placed into two main groups :—

(1) Horsekind, including horses, mules and asses.

(2) Cattle, which include :—

(*a*) European working animals such as those introduced from Spain at an early date following the discovery of the Western Hemisphere.

(*b*) Indian cattle, such as the Zebu, Brahman, or Bos indicus and the Buffalo or Bos babulus.

In some sugar countries where transport on land is reduced owing to the use of waterways (canals) as in the case of British Guiana, the number of livestock, especially cattle on plantations, is reduced, but in other countries the livestock industry is so closely interwoven with the sugar industry, that it is possible for the farmer to shift into either one of these industries, when the other one is on the wane, and this is especially the case in Porto Rico, where large numbers of cattle are maintained on plantations ; here the fields are rotated by letting them go back to grass, and the use made of the fodder is to feed it to the stock.

Horsekind.—Horses are chiefly employed in fast light work, they are used as riding animals, but on many plantations mules are used just as much for this purpose, and this is especially the case where wet cultivation exists. In the days before the motor car, the horse was considerably used as the 'buggy' animal, but even for this purpose, he had in the mule a formidable rival.

The mule is a much more hardy animal than the horse, and from a point of view of general utility he surpasses the horse. It takes less to keep him, and in spite of hard work, the loss due to depreciation at the end of a year is less for the mule than it is for the horse. On sugar plantations mules are used for light ploughing (pony-plough), for cultivation work (horse hoe), for carting canes to the factory, and, as already mentioned, for riding and driving purposes.

It is a recognised policy that the feeding of working horses and mules should be based roughly on 1 lb. of concentrates (oats or maize) per 100 lb. of live weight, but it is remarkable how well a mule will keep on even a quarter of such an allowance whereas in the case of the horse, the loss in condition is considerable, if working is continued. It is true that the planter who cuts his mules' ration to such an extent is really deceiving himself, because one must admit that the farmyard manure from the "concentrate" starved animal is of much less value than that from the well fed one, and further the underfed mule will not be serviceable for the same number of years as the properly fed animal. In some sugar countries, such as the British West Indies, large numbers of Kentucky mules are imported for work on sugar plantations, and they cost as a rule *c.i.f.* £45. In Cuba, Porto Rico and the French Islands (Martinique and Guadeloupe) mules are not used to the same extent, cattle being chiefly employed.

The small farmer plays such an important part in the sugar industry in some places, that this article would be incomplete without some reference to his working animal—the ass—which is chiefly employed in hauling canes to the scale, but takes little or no part in the cultivation of the land. The animal used is generally the unsexed male commonly referred to as the 'Jack' donkey, but it is by no means an uncommon occurrence to see even small jennies and their foals hauling canes to the factory.

In districts where large numbers of donkeys are employed sugar manufacturers should help to improve the farmers' working stock by keeping good donkey stallions for service in their area. Donkeys do well on grass and water, but they should be allowed a small allowance of concentrates either in the form of a dry food—2 lb. of oats or maize a day—or a similar allowance of Linseed meal given in the form of a 'mash' with molasses and water.

Cattle.—The cattle on sugar plantations are mainly employed in slow heavy work, such as ploughing, harrowing, and the hauling of canes to the factory. In some places they carry their yokes on their necks, whereas in others they are yoked behind the horns. The foundation stock of the cattle in most sugar countries in the Western Hemisphere is the Porto Rico ox. This animal has been largely shipped to Cuba, the other West Indian Islands and the Spanish Main. It makes an excellent draft animal, and produces an exceedingly good quality working ox, when crossed with the Zebu or Bos indicus.

Zebu cattle have been introduced into most sugar countries and the types generally imported are large powerful animals such as Nellor cattle, or smaller cattle such as Amrat Mahal, which are very fast, and do well in dry countries. The Amrat Mahal cattle do extremely well in Antigua, but in Trinidad, where it is damper, the heavier type of Brahman cattle do better.

Zebu cattle of all varieties are the working animals employed in India, but in very wet districts the Buffalo is more useful ; it is hardier and is more suitable for heavy ploughing work. Buffaloes have also been introduced from India into some sugar countries, and in some places they are preferred to the Zebu cattle. In Trinidad, where it is damp and wet, the planters are now reducing their grade Zebu herds and using the Buffalo more. They claim that all the light work can be carried out with mules, and the heavy hauling with buffaloes.

Buffaloes are very hardy animals, and seem to flourish where other cattle would starve: they need a well watered district, as they love to wallow in ponds and pools, so that they are unsuitable for such a dry place as Barbados.

In the French Islands, a number of Senegalese cattle are used for working purposes, and some of this class of cattle were at one time introduced into Barbados.

In Martinique and Guadeloupe there is a great liking for the Zebu cattle, and some have been lately introduced from Trinidad. Several Zebu bulls have also been shipped to Cuba from Trinidad, but this may be due to the restrictions placed on the same animals imported from India owing to Foot and Mouth Disease. A very strong point in favour of the Zebu and the Buffalo is that they are as a rule free from ticks and resistant to tick borne diseases.

The Zebu as a rule is a poor milker, but in some, exceptional cases gives as much as 30 lb. of milk a day, besides suckling a calf. The Buffalo especially the variety referred to as the Delhi Rams Horn is an excellent milker and gives milk which is very nicely flavoured with a high percentage of butter fat. This quality of the Buffalo is a highly important one, as on plantations where no proper arrangements are made for an adequate supply of milk for the staff, and where there is a poor herd of cows in milk, the young stock that are being reared suffer considerably.

Cattle on sugar plantations are maintained at the lowest cost possible: in some countries they do well on grass, molasses and water, but in other places this is an impossibility. Where grazing is limited, fodder fields scant or grasses poor, cattle as a rule look in miserable condition, except when the crop season is in full swing. At this period they have a liberal supply of cane tops, and in spite of more work they put on some flesh. It is essential in most cases that cattle should receive a certain amount of concentrates. Service bulls should receive oats and maize, cows in milk a certain quantity of linseed meal and cottonseed meal, heifers and young oxen a certain quantity of linseed meal, bran and oats. Planters however try to reduce the cost per ton of cane by giving very little concentrates to their stock: it is true that the cost per head of stock will increase if they are well fed, but surely the cattle in return would be entitled to a bigger credit in the balance sheet for the manure they have produced.

It is estimated that cattle return 35% to 75% of the nitrogen of their feed in their liquid and solid manure—most of it in the urine—50% to 80% of the phosphorous and 65%-85% of the potash. "If one figures the value of the nitrogen at 15c. a pound, the phosphoric acid at 4c. and the potash at 5c., the manurial value from a ton of cotton seed meal returned in the manure is worth $15.00, from a ton of bran $7.18 and a ton of oilmeal $9.97." (Savage.)

These figures show that by feeding well large values of fertilizing constituents are returned to the soil, and there is a tendency to increase the productivity of a plantation.

A striking example of the use of good manure is afforded in the case of the Government Stock Farm in Trinidad situated not far away from the Imperial College, where a small quantity of canes (40 acres) are cultivated for the purpose of providing fodder (cane tops) for the Dairy cattle in the dry season (February-June). The lands are poor sugar lands, the farm being established on an abandoned sugar plantation. The cows are fed on concentrates containing cotton seed meal, linseed meal, bran, crushed peas and crushed oats, and they receive 3 lb. of concentrates per 10 lb. of milk. The manure from those animals is applied on fodder lands including the acreage planted in cane. These canes were planted for the first time in crop season 1924, and they were reaped as plant canes in 1925, 11 months old, returning 40 tons to the acre. As first ratoons in 1926 the yield was still 40 tons to the acre, and as second ratoons it went up to 46 tons per acre: they were manured as plant canes, and again, during the interval between first and second ratoons.

It is safe, in spite of the unfavourable weather, and the backward condition of ratoons throughout the Colony this year to estimate the return from these canes at 35 tons per acre as third ratoons. The best return in the case of the sugar plantations in Trinidad for the 1927 crop was about 25 tons per acre, and this would include a fair proportion of plant canes.

The value of good farm yard manure is of such importance on sugar plantations that planters should investigate the possibilities of running a dairy, whenever it is possible with the idea of obtaining good pen manure at a very low cost due to the production of milk as a very valuable bye product.

It would appear that a herd of good milking buffaloes would be the class of livestock to supply the dual purpose animal (work and milk) but in countries unsuitable for buffaloes it would be possible to build up a similar dual purpose animal by crossing the Holstein Friesian with the Zebu. The cows from such a cross have produced as much as 60 lb. of milk per day when fresh, and the oxen from such breeding make excellent working animals.

EMPIRE FORESTRY CONFERENCE.

PROGRESS is being made with the arrangements for the Empire Forestry Conference which will be held in 1928. The Standing Committee is working in close co-operation with the Forest Authorities of Australia and New Zealand, and it has been provisionally arranged that the Conference will commence at Perth, W.A., early in September, will be continued in Australia until the middle of October, after which the delegates will cross to New Zealand and spend about a fortnight there visiting both North and South Islands.—*Empire Forestry Journal* Vol. VI, No. 1.

WEST INDIAN NOTES.

The West Indies have played a not inconsiderable part in the development of the Empire ; they have exercised a marked influence on Imperial trade, and incidentally have left their mark on tropical agriculture. Perhaps it may sound a little startling to say that Pepper was the underlying cause leading to the discovery of the West Indies, but I think it can be shown that this was so. The ostensible cause was the desire to find a direct way from Europe to the East and it was the Spice Islands with the lucrative trade that emanated therefrom that were the real objectives, and pepper was the chief spice that determined that quest.

I need not enlarge on the importance to Europe of the trade in spices in the 14th and 15th centuries and how these valuable commodities were brought overland from India and the East by way of Arabia, Persia and Red Sea ports and were the basis of the prosperity of Venice and were of great importance to other European cities.

Prior to the first voyage of Columbus, the Portuguese were making strenuous efforts to find a maritime route to the East with a view to acquiring the highly profitable spice trade. During the 14th and 15th centuries the Portuguese were active in prosecuting voyages of discovery, their work in this direction being developed and fostered in a most remarkable way by the wisdom and foresight of Prince Henry of Portugal, who, born in 1394 and dying in 1460, devoted his life, position and fortune to the systematic encouragement of the work of maritime discovery. He established an important centre of nautical research at Sagres, situated at the extreme south-west corner of his country, projecting right out into the unexplored Atlantic, which was the barrier opposed to adventure westward. At Sagres he set up a School of Navigation where records were kept of voyages of exploration and discovery and where new ventures were resolutely planned. Every year at the instance of Prince Henry, whom we are proud to claim as an Englishman to a large extent, for he was a grandson of John of Gaunt, Duke of Lancaster, expeditions were sent out to investigate the West coast of Africa, of which the navigators of the time were ignorant beyond Cape Bojador ; Prince Henry and the enlightened men of his time being fully convinced that a way to the East might be won by getting round the southern extremity of the continent, as we well know was actually effected by Vasco da Gama five years after Columbus had made his famous voyage in which he discovered the New World and thought that he had achieved that passage to Japan, India and the East which was the eagerly sought goal of the adventurous navigators of the time.

These were the circumstances, having spices as the main incentive, which urged Columbus, and he, by a series of difficulties and hardships was forced into the arms of Spain, country then far behind Portugal in its spirit of maritime adventure. This fact had its bearing on the destinies of the New World, for the Spaniards, not being imbued with the trading spirit as the Portuguese were, sought immediate enrichment by robbing the newly discovered countries of the gold which they possessed, incidentally destroying the civilisations of Mexico, Central America and Peru in the process. Trading, therefore, was not a feature of the earliest history of the West Indies and the countries discovered about that time ; this is in striking contrast to the conditions pertaining to discoveries in the East.

Trade and agriculture received an impetus in the West Indies in the seventeenth century at the hands of the British, French and Dutch, when colonists from those nations established themselves on various islands not occupied by the Spaniards.

It was something of a disappointment to the early discoverers that the West Indies and Central America did not produce those spices, such as pepper and nutmegs which were in such demand, but the West Indies have given many new things to the world and have influenced the trend of commerce and of thought.

Amongst the material contributions made by the West Indies and the adjacent countries discovered with them may be mentioned tobacco, pimento, capsicums, anatto, pineapple, potato, sweet potato, yam, cassava, cassareep, arrowroot, maize, vanilla, while chocolate is an important commodity discovery of which soon resulted from an extension of West Indian exploration.

While the West Indies failed to furnish the much desired spices they soon produced on a commercial scale commodities of great importance. Their earliest crops grown for export were indigo, ginger, and tobacco, but when information was acquired concerning the manner of making sugar from the sugar canes which had been introduced from the outset—knowledge which reached the West Indies through the Dutch from Brazil—the production of sugar soon dominated their agricultural and commercial outlook.

Centering our attention on British interests, it is to be noted that the first British colony was established in St. Kitts in 1623, Barbados being similarly colonised in 1625. About that time British colonisation was rapidly pushed forward in Antigua, Montserrat, and the neighbouring islands. French and Dutch settlers were also actively settling themselves in several of the islands.

Mention has already been made of the first crops grown for export in these islands and their displacement by sugar, but a word or two more about them may not be out of place.

It is interesting to note that relics of the indigo industry still exist in several of the islands—the foundations of buildings and tanks devoted to the industry are still to be met with, while the memory of the industry is preserved where such names as Indigo Piece or Indigo Works are still used to designate fields on some of the estates of these

islands. A further reminder exists in the common occurrence of various species of indigo plants as weeds. I am not aware whether indigenous forms of indigo served as the basis of the early West Indian indigo industry or if recourse, which is probably likely, was had to eastern sources, but it is known that several species of indigofera are indigenous to the western world.

Ginger undoubtedly came from the East: its early cultivation indicates the desire to supplement eastern supplies of spices from western sources. The cultivation of ginger is still carried on to some extent in the West Indies, notably in Jamaica and an extension of the industry has been recommended in the case of Dominica.

A word may be said in passing about tobacco. The world owes its knowledge of tobacco and the habit of smoking it to the West Indies and the New World, for Columbus and his companions found the inhabitants smoking tobacco. Knowledge of the plant and its use for smoking quickly spread to Europe and the Old World, and spread so rapidly and widely that the custom of smoking tobacco has become so widely diffused as to appear almost universal. The smoking of tobacco plays so large a part in the social customs of so many countries, particularly of Eastern Europe and of Asia that it seems difficult to believe that tobacco is a comparatively recent introduction into those countries, being unknown there prior to the discovery of the New World. Its rapid and wide-spread distribution is no doubt due to the abundance and minuteness of its seed in consequence of which the plant is readily distributed by design or accident.

(*To be continued.*)

BRITISH GUIANA.

(*Concluded.*)

In the section on agriculture the long established influence of the Sugar industry on the welfare of the Colony is shown. Of the 57,267,000 acres comprising the area of the Colony, about 3,500,000 acres, 6% of the total, consists of an alluvial belt to which cultivation at present is almost entirely confined. At the end of 1925 the total acreage under cultivation was returned as 139,543 acres, distributed as follows; sugar-cane (57,500), rice (29,333), coconuts (29,979), and ground provisions (11,715), coffee (6,243), cocoa (1,918), limes (655), rubber (2,200). Of these sugar accounted for 53% of the value of the Colony's total domestic exports, rice 3.7% and the remainder about 0.4%. As far back as 1836 when the population was about 98,000 some 59,000 tons of sugar were exported of the value of £1,847,786, the percentage of all exports being no less than 84. In 1925 the figures were appreciably different; the population stood at 304,000; sugar exported, 97,000 tons valued at only £1,551,745, whilst the percentage of sugar exports to total exports had fallen to 53. In their visits to sugar factories, the Commissioners were greatly struck by their efficiency and activity, on the estates side they noticed the provision of fully equipped medical services, light railways for labour transport, and the maintenance of an Experiment Station at Georgetown. In discussion, representatives of the sugar industry were emphatic that in face of subsidised and protected world competition the possibility of progress and even of survival is bound up with the retention of the existing British preference; they claim that secured market associated with a stabilised preference guaranteed, say, for twenty years instead of ten, would give such an impetus to the sugar industry that it would not be unreasonable to expect production to increase to half a million tons annually. The Commissioners, however, regard excessive dependence on sugar as a fundamental weakness of British Guiana and that the Colony needs diversity of production. Efforts have been made with coconut and rubber but these take several years to come to maturity and have failed to prove attractive. The cultivation of ground-nuts is suggested for the consideration of the planters. These nuts are quickly grown, are of value for the oil they contain, and would command a ready market in the United Kingdom. In discussing the development of British Guiana stress is often laid on the necessity for transport facilities and on this subject the report has a few crisp comments. A general demand is recognised for a railway from anywhere to anywhere, sometimes based on knowledge of its possibilities, more often on hope; it is observed that ambition, anxiety as to the future prosperity of the coastal lands and the natural and healthy desire to see the resources of the Colony exploited, contribute to make the demand insistent and urgent. The question of a route, cost of construction and probable operating charges of a railway having as its primary object the exploitation of the timber between the Essequibo and the Muzaruni rivers, and as its secondary object the facilitation of communications with the diamond fields on the one hand and on the other the Potaro District and the basin of the Essequibo and Rupununi rivers, is being investigated at present and it is recognised that any opinions expressed until the production of the report must be of a hypothetical character. The Commissioners rightly mention that better transport facilities have only a partial influence on economic development, and point out that Surinam offers an illustration of the failure of railway development which precedes the proved necessity of it. Assuming that a bold policy is necessary the expenditure should not at present be borne by the Colonial Government. If the Imperial Government were to shoulder interest and sinking fund obligations over a period of years, they would view the matter differently, and, considering the special circumstances surrounding the economic position of the Colony, they think this form of relief warrants sympathetic consideration.

The financial position of British Guiana is unsatisfactory. The Colony's liability for loans raised and to be raised is £4,301,304, whilst a glance at the budget figures of the last seven years shows that only on one occasion has there been a surplus, and that the total net deficit during the seven years amounted to no less sum than £681,985. The securing of equilibrium between revenue and expenditure is regarded as a paramount duty of the Government; it is suggested that revenue be estimated at a modest figure and expenditure ruthlessly restricted to the amount estimated in the annual budget. With regard to sources of revenue the Commissioners think it would be unsafe to depend on any substantial increase from customs duties. These are regarded as already sufficiently high in comparison with the other colonies. A new avenue is suggested by the imposition of a graduated income tax such as is in operation in Jamaica, Barbados, and Trinidad. Export duties, which are a tax on production and operate with particular hardship in the sugar industry, are regarded as a vicious form of taxation, and the Report advocates their abolition if the amount that would be realised by income tax were sufficient to cover the amount now realised by the Export Duties tax and to provide a substantial margin for other purposes. The method of assessing taxation in the Colony is regarded as unsatisfactory. About 83 per cent. of the revenue is collected under Ordinances which are passed by the Combined Court for a period of twelve months only. The procedure is as follows:—When the estimates have been passed, the Combined Court resolves itself into a Committee of Ways and Means consisting of seven official and fourteen elected members. Here the Government proposals are discussed and accepted, amended or rejected. It would seem that four-fifths of the revenue is voted for one year only and that a deadlock between the official and appointed members would result in a stoppage of supplies and inability to meet charges on the public debt. Without this guarantee it is impossible for the Secretary of State to sanction loans being floated in this country under the Colonial Stock Acts. Secondly, the fact that customs duties can be altered from year to year is a disturbing factor for the business community. Thirdly, the practice of throwing the fiscal system yearly into the melting pot is not conducive to a stable, consistent and sound financial policy. After a review of the whole financial position, the Commissioners state that they would welcome any change in the existing Constitution which would give to the people's representatives wider powers of usefulness and greater opportunity for constructive criticism. They do not see how it can be possible either to ensure a consistent financial policy or to exercise efficient control of the Colony's sources of revenue, unless the Government have the power, in the last resort, and under proper safeguards, to enforce their own decisions. The question of direction of fiscal policy is closely bound up with the constitution, which is peculiar and full of eccentricities and anomalies. The present constitution is the outcome of history. Up to the close of the Dutch occupation, the Court of Policy was the only legislative body, and the planters, after a good deal of friction managed to get equal representation. Between the fall of the Dutch Government in Europe in 1795 and the British occupation of 1796, the planters secured a larger measure of control over taxation on lines which crystallised into the present Combined Court. By inadvertence or indifference this innovation was guaranteed by the terms of capitulation granted to the Colony when it was re-occupied by the British in 1803, and the constitution thus established has survived without substantial structural alteration until the present day. The distinctive feature of the constitution is its division of the legislative power between two bodies, the Court of Policy and the Combined Court. To the Court of Policy, consisting of the Governor, seven officials and eight elected unofficial members, and constituted with the Governor's casting vote to secure an official majority, belongs the power of legislation in matters not fiscal; to the Combined Court, that is to say the Court of Policy combined with six more elected members known as Financial Representatives, belongs the power of imposing taxes and in practice the right to control the appropriation of public moneys. In the Court of Policy the Government majority is subject to a potential veto which can be exercised by the elected members inasmuch as if seven of them abstain from attending they can prevent the formation of the quorum required. In the Combined Court, on the other hand, and consequently in matters of taxation or involving expenditure, the elected members possess a majority, and the only limitation to their powers is that they cannot increase, though they reduce or reject, any item on the annual estimates which are prepared by the Governor in Executive Council. Thus this nominally two-chamber system is in fact merely a method of dividing the subjects of legislation into two classes, financial, in which the elected members possess a majority, and non-financial, in which they can only exercise a negative control. The result in the past has been deadlock, sometimes culminating in a total stoppage of supplies, when the policy of the Imperial Government came into collision with the views or interests of the represented classes on question of public policy such as emancipation, immigration, or free trade. Some solution of the difficulties arising is suggested by the existence of a reserve power, directed and controlled by the Secretary of State, to carry into effect official policy in matters of first rate importance, or by securing control through nominated members to the Combined Court. The better plan is regarded as a matter for discussion, which might be referred in the first instance for consideration to a strong local commission appointed by the Governor.

G. W.

TROPICAL WORLD NOTES.

Sierra Leone.

One of the most important exports from Sierra Leone is piassava, and the authorities are displaying great interest in this product. In the annual report of the Imperial Institute for 1926, it is stated that, in connection with efforts which are being made by the Department of Lands and Forests in Sierra Leone to improve the methods of preparing and grading piassava, forty-six samples, prepared experimentally by the Government Agricultural Chemist, were forwarded for examination and report. The samples had been obtained from two different species of raphia palms, from both young and old trees, from different parts of the leaf-sheath, and had been retted for different periods. A full report on the samples was furnished, including the opinions of merchants and manufacturers as to their comparative merits and commercial value, and large samples of the grades of piassava required in this country are being forwarded for guidance in connection with future work. Germany is a large importer of piassava; in fact, in pre-war days Germany's imports of the product steadily increased from 12 tons in 1902 to 546 tons in 1914, and during the last five pre-war years, with one exception, exceeded the imports into the United Kingdom. Since the war Germany has again become an important buyer, and her demands have increased from 73 tons in 1921 to 1,473 tons in 1926.—(*African World*, Vol. XCIX, p. 67.)

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Mauritius.

There are 46 sugar factories as against 50 in 1924 ranging in productive capacity from 1,500 tons to 25,000 tons, and it is anticipated that the number will be further reduced as a result of centralization. There were, on the 31st December, 1925, 17,345 immigrants settled in the Colony, consisting of 12,433 males and 4,921 females, and including 253 new immigrants (195 males and 58 females). The total number of labourers serving under written or verbal contract on estates was 18,018 on 31st December, 1925. The Indian population on estates was estimated at 42,558 on 31st December, 1925—*i.e.*: 16,284 men, 11,511 women and 14,763 children. The fall in sugar prices has led to a further reduction of about 4,000 acres in the total area under cultivation which, at the end of 1924, was about 167,165 acres. Strenuous efforts have been made on Estates to reduce the cost of production. New sugar machinery and tramway material to the value of Rs. 1,350,069 and Rs. 622,687 respectively were imported during the year. Ploughs and tractors are now used on a large scale, and, in view of the much cheapened cost of labour, it is hoped that the cost of production will, henceforth, be considerably reduced. A Sugar Planters Syndicate was formed in 1920 and reconstituted under Ordinance No. 7 of 1921. — (*Colonial Report* No. 1332.)

Java.

Reporting on the vanilla-bean situation in Java, the United States Department of Commerce publishes the following details from Thomas C. Barringer, assistant trade commissioner at Batavia: The exportation for 1926 was less than 2½ metric tons, compared with 15 metric tons in 1925, but the price received for Java beans in 1925-26 did not stimulate production. The 1926 crop, though small, was of good quality, and much better than the larger crops of 1924 and 1925. At present in all Java there are only a few estates interested in the cultivation of the vanilla-bean, and they are not increasing their plantings. The bulk of the crop is brought to market by natives, who gather their produce from the wild plants or from small holdings that are given little or no attention. The production of vanilla in Java from a commercial point of view is not of importance nor does there seem to be a brilliant future in store for it. The outlook for 1927 is not encouraging, as prices offered during 1926 did not stimulate native production.—(*Tea and Coffee Trade Journal*, Vol. 52, p. 444.)

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Uganda.

The decision of the Government to push the cultivation of Robusta Coffee by natives has been received with by no means unanimous approval by members of the Uganda Planters' Association, states the President in his annual report. Some members are in favour of the Government policy—others frankly dislike it. The Government will, realise that the establishment of native coffee growing on a large scale is a serious menace to the well-established European planting industries, unless adequate safeguards are introduced to protect that industry. The three chief dangers are:

(1) The spreading of diseases and insect pests through carelessness and bad cultivation; (2) The lowering of the standard of coffee exported, resulting in Uganda coffee acquiring a bad reputation on the home market; and (3) Most serious of all, a large increase in coffee theft, which is already causing heavy losses on many estates, and which will inevitably increase as native production increases, unless the Government introduce special measures of control. The first danger, *i.e.*: the spread of pests and diseases, should be within the capacity of the Department of Agriculture to cope with, provided that a sufficient number of competent Agricultural Officers are detailed to supervise native cultivation. The second could probably be dealt with by the Government introducing an Ordinance to regulate the marking of coffee consignments, by which native-grown coffee would have to be stencilled "Uganda Native Robusta," and European grown, "Uganda Estate Robusta." A resolution to this effect has been passed by this Association. The third and most serious danger is that of coffee theft. The present Produce Buyers' Ordinance

has signally failed to prevent the crops being stolen and sold to local traders. Many of the buyers must be well aware that they are receiving stolen property. A new and far more stringent Produce Law is urgently required together with such increase in the Police Force as will enable them to ensure that the Law does not become a dead letter.—(*E. A. Farm and Home Journal II*, pp. 82-3.)

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Nigeria.

Lord Selborne, speaking as Chairman of the Bank of British West Africa at its annual meeting, indicated that the trade of Nigeria is not developing to the same extent as that of the Gold Coast, and that, although the colony is in a sound financial position and is rich in natural products, it is suffering from the same general causes which are hindering trade in so many parts of the world. The Gold Coast cocoa producer has increased his income and thus raised the standard of living by securing an increased yield of his product, and the Nigerian producer of palm oil and kernels must follow his example. Sir Graeme Thomson, the Governor of Nigeria, who also attended the meeting, said that only that week fairly comprehensive plans for the introduction of up-to-date oil mills and the establishment of a limited number of plantations, with the object of encouraging the native to adopt modern methods of cultivation and extraction, had been approved by the Secretary of State for the Colonies. Transport and communications were being improved, and native cotton growers had been encouraged in spite of the slump in values. Exports of cotton last year showed an increase of 47,000 cwt., at 179,000 cwt.—(*Manchester Guardian Commercial*, Vol. XIV p. 760.)

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Sumatra.

The intensive and scientific cultivation of the oil palm on the east coast of Sumatra has been often referred to by both local and foreign writers as Netherlands Indies new agricultural industry, and the results achieved in the past six years foster the belief that within ten years the production of palm oil in Sumatra will be of such magnitude that, from the position of a minor export, it will have reached the front rank of principal exports. According to the recent Annual Report by the British Commercial Agent at Batavia, the difficulties encountered by the pioneers of the Sumatra oil palm industry have one by one been overcome. No little credit for the success achieved is due to the scientific research work undertaken by the agricultural chemists of the State Department of Agriculture, working in conjunction with the experimental station at Kampong Baroe, Medan. Planters have also found makers of palm oil machinery ready to meet any suggestions for improvements in the pressing plants supplied, which would tend towards a higher recovery of the oil contents of the fruit.

Bermuda.

Under Regulations of the Board of Agriculture, approved by the Governor-in-Council, on 1st June, the importation of the following plants, &c., has been prohibited until further notice, viz.: banana plants and any part thereof except the fruit, narcissus and lilium bulbs, living plants of snapdragon (*antirrhinum majus*), citrus plants and citrus fruits unless free from leaves, twigs and other portions of the plant from the West Indies and Bahamas, sweet potatoes from the United States, Cuba, Bahamas, British Guiana, Jamaica, Canal Zone and Porto Rico, carrots in their raw and untreated state. In addition, the following may not be delivered without the permission of the Director of Agriculture, viz.: All plants, fruits, bulbs, and other nursery stock intended for planting, bananas, and all citrus fruits from the West Indies and Bahamas, while parcels of plants fruits and bulbs received by parcels post may not be delivered until after inspection. All imported plants are liable to fumigation at the owner's expense if such a course is deemed necessary.—(*Board of Trade Journal*, Vol. CXIX, page 48.)

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Barbados.

The report of the Acting Colonial Secretary of Barbados for 1925-26 states that the year was fair as regards agricultural produce, and the crop returns were larger than in the two previous years.

Sugar shipments were £686,000 in value (47,460 tons) in 1925, compared with £998,000 in 1924, while those of molasses were £396,000 (7,869,275 gallons), against £525,000. The quantities shipped were actually more, but there was a decline in prices. Other notable exports were :—Fruits and nuts, £7,000 ; fresh vegetables, £6,000 ; biscuits, £6,000 ; cotton-seed meal, £3,000 ; hides and skins, £3,000 The quantities shipped in 1926 were :—Sugar. 45,785 tons ; rum, 18,700 gallons ; molasses, 7,760,000 gallons Sea Island cotton, 301, 000 lb.

In connexion with cotton growing, experiments for improving the quality and increasing the yield of lint have proceeded. Unfortunately, growers in most districts have to fight against the pink boll-worm.—(*The Times*.)

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Bahamas.

The sponge industry of the Bahamas suffered from the hurricanes of last year, several beds being wiped out and hundreds of boats destroyed. Many of the sponge fishers are turning to sisal as a source of income, and the cultivation of this fibre has consequently been stimulated. More attention has recently been given to the cascarilla tree, the bark of which is widely in request in connexion with the manufacture of drugs and perfumes. The principal exports last year were:—Sponges, 635 tons ; timber, 9,052,000 ft. ; and sisal, 1,742 tons. Pineapples and tomatoes are grown, but recently labour has been diverted to the constructional work which is being carried out by the Grand Bahama Development Company. —(*The Times*.)

AGRICULTURAL NOTE.

Compiled by the College Department of Agriculture.

Rotation Crops with Cotton.

In an interesting report issued by the Empire Cotton Growing Corporation, Mr. H. C. Sampson, C.I.E., has brought to our notice a large variety of crops, which may prove useful as suitable rotation crops with cotton in East Africa.

The crops are divided into four classes, viz :—Cereals, pulses, oil seeds and fibres. The object, in mind is to find a suitable rotation crop which will give a direct and remunerative cash return ; but at the same time it may be pointed out that many of the crops mentioned, and more especially some of the pulse and fibre crops, are also interesting in connection with green dressings and for the supply of food for stock.

While many rotation crops can be successfully grown, the question of finding a suitable market for them, presents many difficulties. The local demand for grains is very conservative and the requirements of the northern markets are difficult to satisfy, since more attention seems to be paid to colour, size and shape of grains and uniformity than to their actual nutritive value. As the report says: "The following are examples: Madagascar or Lima beans. Varieties of this bean are indigenous to Nyasaland, though the sample which I brought home was grown from seed of an introduced variety. These are at present worth £25 a ton on the London market, provided that the grain is entirely white in colour. The sample which I had was only valued at £12 a ton, because about 5 per cent. of the grains had a small purple colouration at one end. Otherwise the sample was up to the standard of £25 a ton." There are two suggestions for remedying this state of affairs : firstly, to put them on the market and sell them for what they will fetch, till such time as the consumers realise their true value and are prepared to pay for this ; secondly, to carry out further tests on their feeding values and advertise results. Oil seeds and fibres already sell remuneratively on the European markets, and in the absence of excessive railway freights no difficulties should be encountered here.

Of the cereal crops only maize of the American type and mapera or dari (*Sorghum vulgare*) are known at present on the European market. While maize in drills admits of the thorough cleaning of the land, it is at a disadvantage, in that it harbours the American boll-worm, which feeds on the young silk of the maize cob. The sorghums are not very satisfactory, as some species are late in maturing and interfere with the preparatory cultivation for the following cotton crop, while other species are said to have a toxic effect on the soil, which affects the yield of the following crop, and are moreover subject to weevil attack in storage. Machieri or bubrush millet (*Pennesetum typhoideum*) is the most promising cereal. It matures early, is a good yielder, is fairly resistent to weevil attack and compares favourably with barley in feeding value, but unfortunately the price it commands at present on the London market would not cover the cost of growing and of inland transport in the country of origin.

While pulse crops, being leguminous and supplying a large amount of green manure, are invaluable to soil fertility in any system of rotation, some of the difficulties attendant on the marketing of the grains have already been discussed.

Among oil seed plants, from an agricultural point of view, the Sunflower is a very suitable rotation crop. The demand for seed, however, is limited and uncertain, and as in the case of other oil seeds decortication in the country of origin would be necessary in order to overcome transport and freight difficulties.

Annual fibre crops are promising as they make a suitable rotation crop, are easily marketed and show a good profit. They would also supply a large volume of work for the baling presses of the country. These presses represent a high capital outlay, and their upkeep and overhead charges being high, any increase in work for them would greatly lower the cost of baling, which is a heavy item in new cotton areas. The species of Jute, *Corchorus olitorius*, is by far the most satisfactory, and shows great possibilities. Sunnhemp (*Crotalaria juncea*) is another very promising fibre crop, gives a very close cover and smothers weeds. Its optimum period for pulling is more elastic than that for jute, and being leguminous it has the advantage from the point of view of soil fertility. With both crops, the optimum time for pulling is important, as also is experience in retting.

A. L. Baker.

THE BAHAMAS.

The general trade of the Colony was seriously affected during the latter half of the year by the three hurricanes which occurred in July, September and October, for although the imports showed an increase of £398,000 over the previous year, there was a decrease of £40,126 in the export of local produce. Pine-apples, tomatoes and sisal hemp are the chief agricultural products of the Bahamas. Years ago pine-apples were exported in great quantities, but, owing to the deterioration of the stock and the failure of the soil, very few are now grown. The tomato industry, which has only been introduced into the Bahamas during the last few years, is steadily growing and promises to replace that of the pine-apple. The sisal hemp, which is mostly cleaned by hand, is a great help to the Out Islands peasants and tides him over many hard times. Citrus fruit used formerly to be grown in great quantities, but, owing to the invasion of the blue-gray fly, instead of exporting a great deal as previously, not enough is now produced to meet the local demand. An effort is being made to revive this industry.—(*Colonial Report* No. 1330.)

CHEMICAL NOTES.

Compiled by the College Department of Chemistry and Soil Science.

Treatment of land dressed with Straw.

Under conditions of intensive farming, where large amounts of plant nutrients need to be available at specific times, there is much objection to the use of manures containing large amounts of straw, wood shavings, dead leaf trash, and the like, because of their adverse effect on the crop immediately following. This fact has repeatedly been practically demonstrated, and has been stressed in various articles contributed to this Journal. It is now known that the chief reason for crop depression in these circumstances is a marked reduction in available nitrate in the soil, brought about by competition by the micro-organisms that cause decomposition of the bulky added vegetable residues.

The subject has recently received especial attention at the Washington State College, U.S.A. (See *Soil Sci.* Aug. 1927, XXIV, 2, p. 95). Three materials, namely straw, sawdust, and pine needles, were added to soil cultures, and their direct influence on the growth and yield of oats was measured. Attempts were also made to determine whether their depressing effects could be overcome by treatment with nitrogen fertilizers. The plant residues were added at the rate of two tons per acre. The experimental data obtained demonstrate that the depressing effect on growth and yield of crops immediately following the addition of plant residues of low initial nitrogen content may largely be overcome by applying nitrate of soda as a supplement.

This discovery has considerable bearing on sugar-cane cultivation, and suggests that the ploughing in of sugar-cane leaf trash, where practised, should be followed by a suitable addition of some quick-acting nitrogenous fertilizer, preferably nitrate of soda, if depressed yields are to be avoided.

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Starch production in Leaves.

In a recent paper published in the British Journal, *Annals of Botany*, 1927, Vol. XLI, p. 327, Dr. E. J. Maskell (now of the Cotton Research Station in Trinidad) has described the results of his work at the Rothamsted Experimental Station on the rate of starch production in potato leaves. Plants were grown with and without potash fertilizers, three different kinds of potash fertilizers being employed. The experimental data showed that potash fertilizers containing chloride did not appreciably increase the rate of starch production, but that potassium sulphate caused considerable increase, and also increased the rate of translocation of starch from the leaves to other parts of the potato plant. Increased translocation was found not to be entirely due, however, to the potassium factor, but to be influenced also by light intensity and by age of plant.

Potatoes as Soap Material.

A method for the production of soaps and detergents from vegetable materials rich in starch, and particularly from tubers, has recently been patented. The tubers, used in their raw, unpeeled state, are reduced to a fine pulp which is then mixed with a quantity of caustic soda solution. After thorough mixing in a steam jacketed vessel, the vessel is closed and the temperature raised to 210 degrees F. for about twenty minutes, the stirring being continued. In this "sweating" process all substances produced by chemical reactions are retained giving a superior product which is ready for immediate use without further seasoning process. To the mixture of substances so produced is added anhydrous sodium or potassium carbonate. The amount added varies from a weight equal to that of pulp used to approximately half that quantity, according to the quality of soap required. This is followed by a quantity of fatty acid or animal or vegetable oil similar to that used in ordinary soap manufacture. After adding these substances in order or together, the mixing is continued in the closed vessel which is again heated to approximately the same temperature for a period of ten to twenty minutes, when the added oil is saponified or the fatty acid neutralised. By this process excellent soaps of various grades may be produced.—(*Perf. and Esst. Oil Rec.*, Vol. XVIII, p. 204.)

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Utilization of Corn Products.

Two interesting developments in the utilization of the corn crop of the United States of America in recent years, are worthy of note. From the corn grain, commercial glucose in crystalline form has been manufactured, and from the corn cob, formerly a waste material, increasing quantities of furfurol and its derivatives are being produced for use in industries that employ organic solvent liquids.

Formerly, the crystallization of sugar syrups obtained from the corn grain was impossible because of the presence of interfering substances such as dextrins. The difficulties have now been entirely overcome as a result of chemical and technological research, so that nowadays, a white crystalline product of nearly one-hundred percent. purity, may be manufactured at comparatively low cost. In the event of sugar shortage in future times of war, there need be no fear of hardship to United States citizens, because the vast corn crop of their country could easily be converted into a sugar, which, although not identical with cane or beet sugar, is about two-thirds as sweet, and is quite as good a food stuff.

The subscription to *Tropical Agriculture* is six shillings per annum, post free, to all countries within the British Empire or seven shillings, post free, to all other countries. Subscriptions can commence at any time during the year.

ENTOMOLOGICAL NOTE.

Compiled by the Department of Entomology.

The Cotton Hopper.

For the past 25 years a peculiar disorder of cotton plants has been noticed in southern Texas at varying intervals. This disorder has recently appeared in other localities and, in 1923, a study was undertaken to endeavour to determine whether this was due to insect attack or to other causes.

As a result of this study, the United States Department of Agriculture has published Department Circular 361, August, 1926, entitled "The Cotton Hopper, or So-Called Cotton Flea." This insect is a true bug of the family Miridae (Capsidae) and the Circular indicates that there is ground to believe that this bug is intimately associated with the disease or disorder of the cotton plant.

A copy of the summary of the Circular is given herewith. "For a number of years a mysterious disorder of the cotton plant has occurred in certain localities in southern Texas. It is marked by the blasting of the very small squares, an abnormal type of growth, and often the excessive growth of the main stem. It is entirely unlike the disorders of cotton known as brachysm, tomosis, hybosis, stenosis, and cyrtosis. It also seems to be distinct from acromania, although showing more points of resemblance to that disorder.

"No connection whatever has been discovered between the disorder and soil, variety, or cultural or climatic conditions.

"Practically all of the fields in certain large districts have been found to be affected by this disorder. Frequently it is so extreme that no cotton whatever is picked.

"In the last few years the disorder appears to have spread to a number of localities in central and northern Texas, and in 1924 for the first time what appears to be the same thing occurred in South Carolina and Georgia.

"The preliminary experiments reported in this circular are not conclusive in showing that the cotton hopper is the cause or the transmitting agent of the disorder, although they rather strongly suggest that the insect is the vector of a virus and two of the experiments in cages may constitute definite proof. The circumstantial evidence pointing to the hopper as a carrier is (1) the fact that the disorder appears to be similar to several disorders known to be transmitted by insects, (2) the seasonal history of the insect suggests it as a carrier of the infection, and (3) the disorder begins to appear as soon as the insects migrate to the cotton fields from another plant and subsides noticeably after the insects leave for other plants. In some cases, however, the recovery of the cotton plants is so complete that very large top crop is produced, sometimes of sufficient weight to bend the abnormally tall plants to the ground. Moreover the hopper is by far the most common insect in the cotton fields at the time the disorder begins.

MYCOLOGICAL NOTE.

Macrophomina Phaseoli (Maubl.) Ashby.

In the August number of this journal an article appeared concerning the fungus *Rhizoctonia bataticola* (*Taub.*) *Butl.* In an article in the *Transactions of the British Mycological Society*, Vol. XII, Pts. 2 and 3, 30th June, 1927, under the title "*Macrophomina Phaseoli* (*Maubl.*) *Comb. Nov.*, the pycnidial stage of *Rhizoctonia bataticola* (*Taub.*) *Butl.*" S. F. Ashby establishes a new name for the fungus. The author cites the following synonyms for the new combinations *Macrophomina Phaseoli* :—

Macrophoma Phaseoli Maubl. (1905).
Sclerotium bataticola Taub. (1913).
Macrophoma Corchon Saw. (1916).
Macrophomina Cajani Syd. and Butl. (1916).
Macrophomina philippinensis Petr. (1923).
Rhizoctonia lamellifera Small. (1924).
Rhizoctonia bataticola (*Taub.*) *Butl.* (1925.)
Dothiorella Cajani Syd. and Butl. (1925).
Macrophoma Sesami Saw. (1922).

The following extract from Ashby's paper supports the evidence put forward by the writer in the August issue of *Tropical Agriculture* concerning the parasitism of the fungus :—

"Its parasitism appears to be much influenced by the effects of environmental and nutritional conditions on the host ; its restrictions in Uganda to introduced plants is suggestive. In Formosa applications of wood ashes and lime have appreciably reduced losses in jute, and in India on an acid laterite soil, manuring with potash or ash of water hyacinth (*Eichornia crassipes*) has markedly lessened attack on the same host which is sensitive to soil deficiency in available potash."

Ashby's article is particularly interesting since the fungus is also drawing the attention of many mycologists at the present time particularly in Ceylon and the West Indies. The fungus has recently been isolated in Dominica on the West Indian Lime suffering from root disease.

The fungus *Macrophomina Phaseoli* is the subject of two long articles which have been published in the correspondence section of the June number of *Tropical Agriculturist*. "Root diseases of economic crops" is a reply to Dr. Small's previous articles by Dr. Gadd, Mycologist, Tea Research Institute of Ceylon. And "*Rhizoctonia bataticola* and Root disease" is Dr. Small's reply to the above article by Dr. Gadd.

The mycological note in the August number of this journal serves to summarise the present writer's view on both articles except the following issue which has appeared for the first time in Dr. Small's articles :—

"It may be thought that the advance of *Rhizoctonia bataticola* from its first point of entry into the plant can be explained by saying that environment is at fault ; in other words that the plant must be in bad health to permit the fungus to make headway. Here another mistake would be made. The causation of fungus root disease may be regarded from two points of view which may be called the *immediate* and the *ultimate*.

The immediate point of view considers the fungus or fungi which are actually found in association with root disease and decides which organism is responsible for the disease. The ultimate point of view on the other hand, considers the causes, physiological or other, which enables the fungus to attack the plant; in other words, it considers the question why there should be any root disease at all and endeavours to explain the conditions which enable the fungus to establish itself in the roots of a plant. These points of view are distinct from each other, and it may be insisted legitimately that this discussion is concerned only with the immediate point of view. The question at issue, namely the responsibility of *Rhizoctonia bataticola* for root disease, is concerned only with the fungi which are associated with root disease and not with the reasons, physiological or other, why there should be such a thing as fungus root disease. To put the matter differently, the point is that *Rhizoctonia bataticola* is the fungus that enters by the smallest roots and so starts on a career which cannot be regarded as other than parasitic; it is irrelevant to this discussion to introduce the question of the ultimate responsibility of environment for the presence of the *Rhizoctonia* in the tissues of the plant."

It seems to the writer that the terms *immediate* and *ultimate* are redundant and in the case in point their definitions overlap. As stated above the *immediate* point of view decides which organism is responsible for the disease. The only really satisfactory means of doing this is by successful inoculation experiments which surely considers the causes which enable the fungus to attack the plant, *i.e.*: the *ultimate*. Furthermore, the above extract indicates that Dr. Small does not accept the view that the plants are not in a state of disease before the arrival on the scene of the fungus *Macrophomina Phaseoli*. Furthermore, if, as Dr. Small states, the fungus can cause root disease in healthy plants, there is no need for him to consider the *ultimate* point of view at all. The nucleus of the discussion turns on one point namely, the definition of health and disease. A good definition of disease is given by Butler in his book "*Fungi and disease in plants*" p. 75 thus:—"Disease in plants may be defined as variation from normal physiological activity, which is sufficiently permanent or extensive to check the performance of the plant's natural functions or the completion of its development." It might be pointed out, however, that the variation from normal may in the first place be due to the activity of another fungus or other living organism, or due to a physiological factor. When the truth is known it will probably be found that *Macrophomina Phaseoli* follows in some cases a physiological check non-parasitic in its origin, and in others, a physiological check parasitic in its origin. There is evidence already that this is the case. Infection of jute by *Macrophomina Phaseoli* has been correlated with potash deficiency in the soil. In the case of root disease of lime trees in Dominica the one constant factor found was insect injury to the roots. There were several other physiological factors too but it was only the damage to the corticel tissues of the roots by insect grubs which was universal.

It is also submitted that it is not irrelevant to the discussion to introduce the ultimate responsibility of environment for the presence of *Rhizoctonia* in the root tissues of the plant. This is the very great mistake which many mycologists make in connection with diseases of plants in general. The importance of the fungus is often laboured so much that one almost forgets the existence of the host plant. In ninety per cent. or more of the known cases of disease in plants, the physiological or other predisposing factors to disease are far more important than the fungus parasite which follows, because on this knowledge is based the measures for controlling disease. Thus marked progress in the knowledge of disease in plants in the future must follow the increase in knowledge of plant physiology (host and parasite). Before plant physiologists can advance perceptibly in their knowledge they must work in close liaison with biochemists. Indeed one might go further and state that training in plant physiology is becoming more and more interlocked with biochemistry as time goes on. It, therefore, behoves plant pathologists to follow and modify their views accordingly. In this connection it is interesting to consider briefly what is meant by the term health. Butler defines it thus "In health, a plant is in what might be described as a condition of equilibrium, that is to say, all its internal functions and processes are graded to suit a particular set of external conditions." This statement is equally applicable to a plant in a diseased condition. Excluding the little understood phenomenon known as "Mutation," a plant cannot do anything under any conceivable conditions, but respond to a hair line to external or internal conditions. The most accurate definition of health would presumably be based on the biochemical composition of the plant in question and this changes from minute to minute during the whole of its life history.

H. R. BRITON-JONES.

TOPICAL interest attaches to United States Department of Agriculture *Miscellaneous Circular No.* 107 just issued, by Dr. E. W. Brandes, the well known sugar-cane pathologist. It appears that one of the serious consequences of the recent Louisiana flood is a danger that the supply of planting material of certain P.O.J. canes, on which rested the hopes for a return to normal production in Louisiana in 1928, will be insufficient. The circular points out the possibility of increasing stocks by immediate transplantation of suckers from surviving stools, gives a description of the process, and strongly urges the adoption of this method wherever it is at all possible, expensive as it is. Complete plantations of these P.O.J. canes in the autumn of 1927 can alone save many planters from ruin.

SUGAR NOTES.

Compiled by the College Department of Sugar Technology.

Molasses yield affected by soil.

A. Bonazzi, of the Chaparra Experiment Station, Cuba, writes that as a part of the study of correlation between the composition of the sugar-cane and the soil on which it is found growing, some observations were made which seem to point towards a hitherto unexpected industrial application of the analytical data of the laboratory.

Four maps were constructed of the island of Cuba, (1) Topographic, (2) Geologic, (3) With contours representing per cent. K_2O in megass, and (4) With contours representing per cent. P_2O_5 in cachaza. A map was also made with contours representing values for $\frac{M}{S}$, where M is units of molasses and S is units of sugar.

From these maps it was found that Potash in megass increases with increase of Ca in soil, and the same conclusion is reached with regard to the quantity of phosphoric anhydride in the cachaza.

The K_2O in ash and P_2O_5 in cachaza can be taken as indicators of salt content of cane juice, so it would appear that these two compounds should affect the crystallizing capacity of the massecuites derived from the juices of these regions. If the high efficiency factor $\frac{M}{S}$ indicates a high melassigenic power of the juice impurities, we find that, where cane is grown on limestone soils, it had impurities which did not tend to the high production of molasses. And canes grown on soils of a siliceous origin yielded high melassigenic juices. In spite of various irregularities such as, 1, reconnaissance nature of geologic map, 2, inaccurate data from a limited number of imperfectly working mills, and, 3, the fact that cane for some mills is hauled from a distance, the indications are such that the main geologic regions fit perfectly with the other chemical maps of this region.

* * *

Kopke Centrifugal Separation.

At the factory of the Hawaiian Commercial and Sugar Co., Kopke centrifugal separators handled the entire settlings from the Dorr clarifiers, the mechanical ease of operation and the rapid despatch of juice from the settlings back to process causing a favourable impression. But the polarization of the final mud averaged 4.9% possible of reduction, only by a system of double purging, not practicable with the existing installation. As obtained, this polarization was the result of dilution of the settlings before entering the separators, not the most economical method of using water in this connection. Including depreciation and interest costs, the centrifugal separator plant was estimated to cost 13 cents per ton of sugar, as compared with 19 cents for plate-and-frame presses, the saving of heat and the rapid liquidation of juice from the settlings, favouring the application of this new method, as compared with that ordinarily used. But it would appear that the greatest advantage of centrifugal separation is that refractory material which would give endless trouble with filters may be easily handled the final polarization of the mud being positively attained without regard to fluctuations in the filtering characteristics of the settlings. Muds worked at Punnene judged by laboratory standards seemed to be more difficult to filter than any within the experience of many observers, yet, the operation of the centrifugal separators proceeded with impressive smoothness, it being merely a matter of providing adequate capacity to enable the operators to fix the polarization of the mud within any desired limit, within reason. A further advantage proved is that it enables one to realise the maximum benefit from the removal of cush-cush by means of the Peck or other strainer, this removal actually assisting the work of the separators in that it reduces the amount of solids to be eliminated. But the unfavourable factor is the greater quantity of water it is necessary to use to reduce the polarization of the mud, as to reduce to 1.5 or 2% would probably require 400 to 500% water on the mud by weight. Centrifugal separation has, however, been given sufficient trial to warrant the conclusion that it is mechanically feasible, though one must await further investigation of actual costs and savings to demonstrate the true value of this method of disposing of the settlings.

* * *

A new theory of Molasses formation.

More light is thrown on the complex question of molasses formation by the research work of W. Cassel and A. Todt. They find that the most difficult point to explain is that small amounts of inorganic salts decrease the solubility of sucrose, but large amounts increase it. Assuming that the solution of sugar is represented by $Z+n\ H_2O = Z\ (H_2O)n$, and that of salt by $NaCl + (x+y)\ H_2O = Na + (H_2O)\ x + Cl^-(H_2O)\ y$, either reaction may use up enough H_2O to lower the equilibrium concentration for the other. This explains the decrease of solubility. But the dissolving power of most solvents is a function of their dielectric constants. By extrapolating the dielectric constants for strong sugar solutions to 100% sucrose, a value of 50-55 for fused sugar was obtained, which is of the same order of magnitude as that of H_2O. Hence sucrose itself may act as a solvent and the reaction then becomes $NaCl\ (x+y)\ Z = Na + Zx + Cl^-Zy$. To confirm this, sucrose was carefully fused and its electric condition determined as $0{\cdot}1-0{\cdot}2 \times 10^{-6}$. If 5 g. KCl were added to 50 g. fused sucrose, the electric condition rose to 80×10^{-6}. Fused sucrose at about its melting point dissolved easily 10% by weight of KCl. The function of the organic non-sugars is less clear; probably they hinder crystallization by absorbtion on the nuclei and by increasing the solubility of the solution.—(*Deut. Zuckerind.* 51, 1926.)

REVIEWS.

INDIA IN 1925-26. — Published by the Government of India, Central Publication Branch, Calcutta. Price 3*s*. 3*d*.

This book is a statement of the affairs of India during the period 1925-26, prepared by Mr. J. Coatman the Director of Public Information to the Government of India, for presentation to Parliament in accordance with the requirements of the Government of India Act. Of the eight chapters of which this publication consist, no less than five are devoted to an exhaustive description of political conditions inside her boundaries, and a sixth chapter is reserved for defence problems and foreign policy. To the student of political economy these detailed reports should prove of value since they describe in some detail the rapid and kaleidoscopic changes that are taking place in Indian domestic policy since the introduction of the Reforms. It is a somewhat remarkable fact, that in a general review of this nature, only eight pages should have been allotted to an account of agricultural matters. When it is realised that somewhere about 90% of the whole population are either directly or indirectly dependent on agriculture for their livelihood and that the vast majority of the revenues of this country come from the land, this fact, is all the more amazing especially to such as have no intimate knowledge of India or the Indian Government. If a little of the attention that is paid by the intelligentsia in India to politics, were applied to the improvement of agriculture by scientific methods the country would go ahead more rapidly. For the rest, the chapter on "Finance and Commerce" is full of interesting facts, and will well repay study and it helps to show the reason why India has recovered so rapidly from the post-war depression, in spite of so much political strife during this period.

G. E.

* * *

CO-OPERATION AND COMPETITION IN THE MARKETING OF MAIZE IN SOUTH AFRICA.—Herbert Frankel, M.A., London, P.S. King and Sons, Ltd., 1926. 8*s*. 6*d*. net. pp. xi + 144.

Mr. Frankel is not keen about co-operation in South Africa. There are so many writers blindly enthusiastic that it is pleasing to read a reasoned comparison between private and co-operative enterprise in the marketing of a particular commodity. The author states that co-operation in South Africa was introduced by the State and that the possibility of lack of comprehension on the part of the farmers, was overlooked by those introducing the system. Following an account of the development and present position of the South African maize trade, it is shown, and supported by statistical evidence, that the co-operative system is less efficient than the competitive maize marketing system.

G. W.

KERSEY: Farm Book-keeping, pp. 96. Headley Brothers, Ashford, Kent.

The object of this book is to provide a simple method of book-keeping which will give farmers and others a thorough knowledge of their financial position, without demanding too much of their time or too intimate an acquaintance with book-keeping. The book is divided into two parts, the first devoted to the so-called single entry method and containing several examples the value of which is most likely to be realised by Mr. Kersey's students, unless he publishes solutions for the private reader. The second part is devoted to a system which claims to possess all the advantages which are obtained by keeping accounts with the ordinary method of double entry at a considerable saving in time and trouble. The scheme, which was recommended to the attention of farmers by the Board of Agriculture, avoids many ledger accounts by tabular analysis in the cash book. To close the books, on the receipt side are added the cash analysis columns, sundry debtors, valuations, and on the payment side, cash analysis columns, sundry creditors, valuations at the beginning of the year. These are balanced and the balances transferred to the Profit and Loss account. In both parts the book is sound but the trouble with tabular analysis is that the number of analysis columns tends to grow beyond the capacity of the account books. Ledger accounts seem to be more elastic—the principles of double entry book-keeping are extremely simple and although the author's short methods are suggestive and valuable, a knowledge of the usual method of double entry would enable the farmer to simplify his books according to his needs.

G. W.

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PITMAN'S COMMON COMMODITIES AND INDUSTRIES SERIES, London, Pitman & Sons, Ltd. Price per volume, 3*s*.

This series of booklets provides precise information on a large number of subjects, each of which is presented by a recognised authority. Of especial interest to tropical agriculturists, the following volumes may be recommended. *Alcohol*, by C. Simmonds; *Cocoa and Chocolate*, by A. W. Knapp; *Coffee*, by B. B. Keable; *Cold Storage*, by B. H. Springett; *Jute and Hemp* and *Fibres*, by T. Woodhouse and P. Kilgour; *Cotton*, by R. J. Peake; *Gums and Resins*, by E. J. Parry; *Internal Combustion Engines*, by J. Okill; *Tea*, by A. Ibbetson; *Sugar*, by G. Martineau; *Oils*, by C. Ainsworth Mitchell; *Rubber*, by C. Beadle and H. P. Stephens; *Tobacco*, by A. E. Tanner; and *Starch*, by H. A. Auden. This list by no means exhausts the topics that are described, each within the limits of some 150 pages, by different writers, in simple non-technical language. The series offers a splendid introduction to the study of the great industries, and is in keeping with the excellent commercial handbooks for which Messrs. Pitman have long been famous.

F. H.

KAFFEE.—von Prof. Dr. A. Zimmermann.

REIS.—von Prof. Dr. H. Winkler.

Deutscher Auslandverlag, Walter Bangert, Hamburg, 1926. Each Rm. 5.

These two little German books, which slip easily into the coat pocket, belong to a new series on tropical agriculture which Messrs. Bangert are bringing out. They contain little that is new, but as summaries of the scattered literature on the crops concerned are right up to date. There are text-books in English covering much the same ground, but bulkier and more expensive.

Dr. Zimmermann gives 39 pages on the botany of the Coffee species, embodying the work of Cramer and others in the East Indies, and follows with sections on cultivation, diseases, the preparation of the crop, and the product.

Dr. Winkler follows the same plan. On the botany of rice he is much briefer, perhaps because there was less to say, but he gives an extensive bibliography of his crop, which is alone almost worth the price of the book.

E. E. C.

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THE YEAR BOOK OF THE BERMUDAS, THE BAHAMAS, BRITISH GUIANA, BRITISH HONDURAS AND THE BRITISH WEST INDIES, 1926-27. *Canadian Gazette* Ltd., London, E.C.2, and Associated Canadian Industries, Inc., Broadway, New York. Pages 368+vi, 260 Illustrations and Map. Price 4*s*. 6*d*.

The scope of this handbook can, perhaps, best be described by quoting from the Preface. "The idea has been to publish on the one hand facts and figures for the special use of the commercial reader, and, on the other hand, to illustrate the attractions and beauty of the Colonies from the standpoint of the tourist and the traveller . . . The plan followed in each section has been to provide a brief historical account followed by a reference to administration and executive, a statement of the financial position, tables relating to trade and commerce, a description of the natural resources, a summary of the educational, shipping, postal and other facilities, a list of leading firms, and the Customs tariff in full."

Portions of this publication are excellent, but others show signs of hasty compilation. In the section dealing with sugar, we learn with surprise, under the heading of Barbados, that, "In that year (1924) an effort was made to supplement the labour of the Colony by East Indian immigration, but the possibility of drawing labour from India in the quantity required is now regarded as remote, and other sources of supply will have to be tapped if this vast and rich area is to receive the attention it deserves:" (p. 15). This information evidently refers to British Guiana. Careless proof reading is responsible for the statement that the present Duke of York was "born December 14, 1595" (p. 7). A similar error attributes ten defeats to the 1926-M.C.C. XI which visited the British West Indies and British Guiana, in spite of the fact that immediately afterwards Barbados is ascribed "the honour of inflicting the only defeat suffered by the visitors." (page 53.)

In a handbook, compiled from a very wide variety of sources, errors of this kind invariably occur and are mentioned merely with the object of emphasising the need for more accurate proof reading in subsequent editions. The 260 illustrations, although of varying interest and quality, form a prominent and attractive feature. The price is ridiculously small and with the correction of the blemishes referred to above this handbook should form a most useful addition to publications on these colonies.

C. Y. S.

* * *

THE PRODUCTION OF COTTON.—By Gilbert H. Collings, pp. 256, London, Chapman & Hall, Ltd.

The title of the book would lead one to believe that it contained a comprehensive review of the cotton industry of the world. This is not the case. It deals fully with American conditions of cotton growing and with American varieties of cotton, but the information given with regard to cotton and cotton growing in other parts of the world is negligible. The book is written primarily for students in agricultural colleges, for teachers and graduate students in agriculture, and yet it deals in the most elementary way with the morphology of the plant. Again, in the chapter on fertilisers for cotton, the classification, history, sources of production and manufacture of all the chief commercial fertilisers are given, and the patient reader endeavouring to obtain some information on the manuring of cotton is confronted by such statements as "dried blood, as the name indicates, is made up principally of dried blood," on page 84. Keeping in mind the original object of the book, it is surprising to find so much superfluous matter included, and but for this, it might have been of some value as a treatise on cotton in America. The book is well printed and the illustrations are numerous and excellent.

A. L. B.

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THE ELEMENTS OF MATHEMATICS.—D. Caradog Jones, M.A. and G. W. Daniels, M.A., M.COMM., pp.viii, 240. University Press of Liverpool Ltd. 8*s*. 6*d*. net.

Students of economics with only a limited knowledge of mathematics may attack mathematical expositions, but will most likely soon retire. Even the persistent ones, who refer to separate books on algebra, trigonometry, conics and the calculus begin to wilt, because the average work on mathematics that would come within their scope is planned to keep youths occupied rather than provide knowledge. The present work is quite helpful, it brings within small compass a lot of fundamental conceptions.

G. W.

COLLEGE NEWS.

Mr. G. Evans, Principal, returned from England by the s.s. *Carare* on 10th September.

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Mr. L. A. Corbin, Accountant and Manager of the Milner Hostel, returned from leave on 5th September.

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We regret to announce the death of Sir Arthur Everett Shipley, G.B.E., F.R.S., who was Chairman of the Governing Body of the College.

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Dr. H. R. Briton-Jones has been appointed Dean of the College in addition to his duties as Professor of Mycology and Bacteriology.

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Miss E. B. Robinson, senior typist in the Principal's office, left for England by the s.s. *Coronado* on 6th September on three months leave.

* * *

The power house of the Electric Plant has been completed and the installation of the Plant is being proceeded with and it is hoped will shortly be ready.

* * *

Professor H. A. Ballou left Trinidad on 17th September, for a short visit to St. Vincent in connection with his duties as Commissioner of Agriculture.

* * *

At the request of the Crown Agents and the Government of Fiji, the Principal has agreed to accommodate Mr. C. H. Taylor, an Entomologist of the Fiji Agricultural Department, who is to come over here for a few months to conduct special research work on certain parasites. Mr. Taylor is expected to arrive at the end of this month.

* * *

The erection of the sleeping quarters of the Milner Hostel has been completed. Work on the Dining Hall is being proceeded with as rapidly as possible and it is hoped this will be sufficiently far advanced to accommodate the students on their arrival on 8th October. The exceptionally heavy rains of the last few weeks have, however, hampered progress somewhat.

* * *

The Governors of the College have sanctioned the new post of Assistant Editor to the College Journal *Tropical Agriculture*, whose duty will include the control of the Library. This step has been necessitated by the rapid extension of the Library and the increased circulation of *Tropical Agriculture*. No definite appointment has yet been made, but it is hoped to fill the position shortly.

* * *

Many of the Students who were at the College for the session 1926-27, have now proceeded to different parts of the Empire to take up agricultural work. Notifications have already been received of the appointments of the following Empire Cotton Growing Corporation students:

Mr. P. A. Bowmaker has been appointed as assistant to Mr. F. S. Parsons who is in charge of the Corporation's Experiment Station at Candover, Natal.

Messrs. O. V. S. Heath and L. H. Stone have been appointed assistants to Mr. F. R. Parnell at the Corporation's Plant Breeding Station at Barberton, Transvaal.

Mr. D. McDonald is taking over the experimental work on cotton in Swaziland, which was commenced by Mr. R. C. Wood.

Messrs. V. F. O. Olivier and J. S. Moerdyk returned to South Africa to take up appointments under the Ministry of Agriculture.

* * *

In extension to studies on the question of malaria as a factor in the production of nephritis, Dr. Seagar recently paid a visit to Barbados. We add some interesting reflections on the general state of health in that Island which are taken from his report.

"The striking features of the health problem in Barbados are the remarkably heavy infantile mortality and the great prevalence of bowel diseases, syphilis and pellagra.

The geological formation of the Island consisting as it does of a coral cap on clay base, except for the outcrop of rock in the St. Andrew's district, enables all surface water to percolate downwards, so that you do not get collections of water of a type that suits the bionomics of the anopheline mosquito, consequently the Island is malaria free . . . In many places excellent water can be reached by boring from 100 to 150 feet through the coral and limestone on to the clay base . . . It is usually held that water in such porous country with limestone cracks that are potential avenues of pollution is dangerous, but the depth at which the water is obtained in this case and the care which is taken of the immediate soakage area probably helps to explain the fact that the water obtained for Bridgetown is an exceptionally pure water tested both bacteriologically and chemically. Certainly the pit privy system in vogue all over the Island in conjunction with some of the private shallow wells renders the water in those cases not above suspicion . . . On close investigation of the facts it would appear that the outbreaks of typhoid are due to carriers and direct spread rather than to drinking water pollution.

I saw many cases of "oedema disease" in children, particularly infants which appears to be due to defective diet but is usually ascribed to parasitisation with helminths or is set down as true acute nephritis . . . There is an epidemic condition in children which consists of an impetiginous eruption followed by oedema and nephritis which would appear to be of a streptococcal nature and clears up if the patient recovers.

As regards the heavy incidence of pellagra compared to Trinidad it appears again to be a matter of defective diet. The natural food resources and economic conditions of the native labourer are not so favourable in Barbados as Trinidad. Again the appalling infantile mortality (314 per 1,000 births in 1926) would appear to be due to two basic factors—defective diet and syphilis."

TREND OF THE MARKETS.

[*The notes below are based principally upon running charts of the prices of the basic grades and upon general statistical information gleaned from contemporary publications and cablegrams and are intended to be a record of movements. An attempt is made, where possible, to indicate the market outlook at the time of going to press, but no responsibility for the accuracy and subsequent truth of such observations is assumed. Unless otherwise stated the prices quoted are spot, London.*]

SUGAR.—Up to the end of August there was little change in cane or beet sugar. According to the *West India Committee Circular* quotations on 25th August were as follows: London Granulated, 30*s.* 9*d.*; Imitation Yellows, 28*s.* 6*d.*; West Indian Crystallised, 30*s.* to 34*s.* with only a small business reported; White Mauritius 27*s.* 6*d.* to 28*s.*; British Grown Granulated, new crop, 29*s.* (October) and 28*s.* 6*d.* (November-December); Czecho-Slovakian, 29*s.* 7½*d.*, all duty paid. Raw centrifugals are quoted at 16*s.* 6*d.* for Preferentials and 13*s.* 1½*d.* for Cubans. On 15th September, foreign 96° *c.i.f.* cwt. was quoted at 13*s.* 6*d.* Preferential at 17*s.* 1½*d.*, Yellow crystals, landed duty paid at 29*s.* to 34*s.* 6*d.*

* * *

COTTON.—At the end of last month (August) prices showed a further sharp advance. Unfavourable crop reports and a report by the United States Government indicating serious infestation and considerable damage, have fed a bullish speculative fever. Trade over the world is poor with the exception of Germany. Middling American spot on 24th August stood at 11.20*d.* West Indian Sea Island, *c.i.f.* per lb. 3*s.* 6*d.* (15th September).

* * *

COCOA.—Throughout August business remained quiet, business being done on a small scale. On 15th September quotations for Trinidad L.L.T. were 80*s.* to 84*s.* per cwt. and Grenada L.L.T. 77*s.* to 79*s.*

* * *

COFFEE.—The large arrivals of coffee in late August proved a little difficult to assimilate. Jamaica showed a range from 104*s.* to 212*s.* per cwt.

* * *

TEA.—The trade continues healthy in all its branches. At the end of August the averages compared with a year ago were as follows: Ceylon 20.44*d.* (1926, 18.83*d.*), Indian 18.97*d.* (17.87*d.*), Java 14.78*d.* (14.83*d.*), Sumatra 15.20*d.* (15.24*d.*), Assam 21.94*d.* (18.88*d.*), and Darjeeling 21.93*d.* (22.48*d.*).

* * *

COPRA.—Sales have comprised, Malabar at £28 2*s.* 6*d.*, Zanzibar £25 12*s.* 6*d.*, Mozambique £25 15*s.*, Mauritius £26 7*s.* 6*d.*, Seychelles £26 12*s.* 6*d.* Cebu £25 16*s.* 3*d.* and Java at £26 16*s.* 3*d.* West Indian, *c.i.f.* per ton was quoted at £27 on 15th September.

RUBBER.—Messrs. Lewis and Peat Ltd., report on 24th August that "the market has been quiet, and except for a good continental demand, the tone has been lifeless, America has been taking little or no interest, this must be partly attributed o the holiday season." On 15th September Plantation Sheet stood at 1*s.* 4½*d.* per lb.

* * *

FERTILIZERS.—On 27th August the *Times Trade and Engineering Supplement* gave the following: "Sulphate of Ammonia is a little firmer and Sulphate of Potash a little cheaper. Nitrate of soda and Cyanamide are in a somewhat unsettled state, but no change from the alteration recently quoted is noted. Bone manures sell rather well, and there is a good sale for fish guano together with a revived inquiry for superphosphate."

COCOA BEAN PREFERENCE.

SIMULTANEOUSLY with the proclamation of the tariff concessions provided for under the trade agreement of 1925 between Canada and the British West Indies, Bermuda, British Guiana, and British Honduras, the Dominion Government has withdrawn from the British Colonies of the Gold Coast, Lagos, and other British possessions to the West of the Niger River, the benefits of Canada's British Preferential Tariff as regards cocoa beans not roasted, crushed, or ground, and has declared the intermediate tariff of $1.50 per 100 lb. applicable to cocoa beans imported from these West African colonies. This action has been taken to implement an undertaking in the Canada-West Indies agreement, in order to give an effective preference on cocoa beans from the West Indies and more especially from Trinidad. Canadian cocoa manufacturing and chocolate confectionery firms which have been using cocoa beans from West Africa objected strongly but unsuccessfully to withdrawal of the benefit of the Preferential Tariff from British West Africa, on the ground that it would entail an increase in the cost of cocoa beans to these Canadian industries. Changes in the Canadian Tariff were made last year to give effect to the provisions of the agreement with the West Indies, but prior to 30th April this year, cocoa beans from West Africa were admitted free of duty, on equal terms with the West Indies product. The treaty arrangement regarding bananas will be held in abeyance until after the direct steamship service between Canada and the British West Indies has been completely established. At the present time, bananas from all sources are admitted duty free, but after the direct steamship service is provided the benefit of free entry will be restricted to bananas imported from the place of growth, in a country entitled to the benefit of the British Preferential Tariff, by ship directly to Canadian port, and all other bananas will be dutiable at 50 cents per stem of bunch.